Data Evaluation Report on the Reproductive Effects of Chlormequat Chloride on Japanese Quail (*Coturnix coturnix japonica*)

PMRA Submission Number {.....} EPA MRID Number 467152-14

Data Requirement:	PMRA Data Code	{.....}
	EPA DP Barcode	D325185
	OECD Data Point	{.....}
	EPA MRID	467152-14
	EPA Guideline	non-guideline

Test material: Chlormequat Chloride **Purity:** 66.9% ai
Common name Chlormequat chloride
Chemical name: IUPAC: 2-Chloroethyl-trimethylammonium chloride
CAS name: Not reported
CAS No.: 999-81-5
Synonyms: CCC; BAS 062 W

Primary Reviewer: Brian D. Kiernan **Date:** 8/02/2006
EPA/OPP/EFED/ERBIV

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Company Code	{.....}	[For PMRA]
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Use Site Category:	{.....}	[For PMRA]
EPA PC Code	018101	

Date Evaluation Completed:

CITATION: Mitchell, L.R., J.B. Beavers, and M. Jaber. 2001. Chlormequat Chloride (CCC): A Reproduction Study with the Japanese Quail. Unpublished study performed by Wildlife International Ltd., Easton, MD. Laboratory Project No. 514-102. BASF Registration Document No. 2001/1006189. Study submitted by BASF Corporation, Research Triangle Park, NC. Study initiated February 7, 2000 and submitted March 23, 2001.

DISCLAIMER: This document provides guidance for EPA and PMRA reviewers on how to complete a data evaluation record after reviewing a scientific study concerning the reproductive effects of a pesticide on avian species. It is not intended to prescribe conditions to any external party for conducting this study nor to establish absolute criteria regarding the assessment of whether the study is scientifically sound and whether the study satisfies any applicable data requirements. Reviewers are expected to review and to determine for each study, on a case-by-case basis, whether it is scientifically sound and provides sufficient information to satisfy applicable data requirements. Studies that fail to meet any of the conditions may be accepted, if appropriate; similarly, studies that meet all of the conditions may be rejected, if appropriate. In sum, the reviewer is to take into account the totality of factors related to the test methodology and results in determining the acceptability of the study.

EXECUTIVE SUMMARY

The one-generation reproductive toxicity of Chlormequat Chloride to 20 pairs per level of 16-week old Japanese quail (*Coturnix coturnix japonica*) was assessed over 6 weeks. Chlormequat Chloride was administered to the birds in the diet at nominal concentrations of 0 (negative control), 160, 400, and 1000 mg ai/kg dw diet. Mean-measured concentrations were <0.05 (<LOQ, control), 158, 387, and 982 mg ai/kg diet, respectively. The most sensitive endpoints were the adult parameters of food consumption and male body weight gain; both endpoints showed significant adverse effects at all treatment levels. As a result, the NOAEC could not be determined (<158 mg ai/kg diet). The study author's analysis also detected statistically-significant reductions in adult male testes weight, as well as reductions in the number of viable embryos, and statistically-significant reductions in the number of normal hatchlings and 14-day old survivors. In addition, egg shell strength and thickness were statistically-reduced compared to controls.

No treatment-related effects on adult mortality or female body weight were observed, and there were no clinical signs of toxicity or treatment-related findings upon necropsy.

The study author reported a statistically-significant reduction compared to controls in testes weights of males from the 982 mg ai/kg diet level (3.441 versus 4.107 g).

While not statistically-significant, there was a treatment-related reduction in viable embryos as a percentage of eggs set in the 982 mg ai/kg diet treatment group compared to controls (67 versus 85%). This reduction was also reflected as statistically-significant reductions in normal hatchlings and 14-day old survivors as percentages of eggs set, and the numbers of normal hatchlings and 14-day old survivors per hen per day. Egg quality was also affected at the 982 mg ai/kg diet level, indicated by statistically-significant reductions in egg shell strength (11.881 versus 12.246) and egg shell thickness (0.216 versus 0.223 mm). No other statistically-significant differences from controls were observed on any other reproductive endpoint at any treatment level.

This toxicity study is scientifically sound. However, due to considerable variation from OPPT guidelines for an avian reproduction study and the failure to determine a NOAEC, this study is classified as SUPPLEMENTAL.

Results Synopsis

Test Organism Size/Age(mean Weight): 16-weeks old; 91-164 g (combined sexes)

NOAEC: <158 mg ai/kg diet
LOAEC: 158 mg ai/kg diet
Endpoint(s) Affected: food consumption and male body weight (most sensitive endpoints), number of hatchlings of eggs set, number of cracked eggs

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: The study protocol was based on procedures outlined in the draft OECD Guideline for Testing of Chemicals, *Avian Reproduction Toxicity Test in the Japanese Quail or Bobwhite Quail* (1999). This study was submitted to fulfill the OPPTS 850.2300 guideline requirement. Deviations from OPPTS 850.2300 included:

1. The treatment period was 6 weeks, whereas a minimum 20 week study is required. Consequently, body weight determinations were less frequent than required.
2. Northern bobwhite quail are the preferred species for upland game bird testing.
3. Test birds were only 16 weeks old at study initiation. Birds at least 7 months old are recommended.
4. Pen floor size was considerably less (688 cm^2/quail) than recommended (at least 5000 cm^2/quail).
5. The collected eggs were stored at 13.4°C prior to incubation. This is slightly less than the recommended storage temperature of 16°C.

These deviations did not affect the scientific soundness of the study.

COMPLIANCE: Signed and dated GLP, Quality Assurance and Data Confidentiality statements were provided. This study was conducted in compliance with GLP standards of the U.S. EPA with the following exception: the stability of the test substance under conditions of storage at the test site was not determined in accordance with GLP.

A. MATERIALS:

1. Test Material Chlormequat Chloride

Description: Liquid

Lot No./Batch No. : 2000-1

Purity: 66.9% (w:w)

Stability of compound under test conditions: Stability was verified at all treatment levels under actual use conditions. Samples were either assessed after 7 days of ambient feeder storage or after 5 weeks of frozen storage followed by 7 days of ambient feeder storage. Recoveries were 89-113% of initial concentrations.

(OECD recommends water solubility, stability in water and light, pKa, Pow, and vapor pressure of test compound)

Storage conditions of test chemicals: Under refrigeration

Physicochemical properties of Chlormequat Chloride.

Parameter	Values	Comments
Water solubility at 20EC	Not reported	
Vapor pressure	Not reported	
UV absorption	Not reported	
pKa	Not reported	
Kow	Not reported	

2. Test organism:

Table 1: Test organism.

Parameter	Details	Remarks *Criteria*
Species (common and scientific names):	Japanese quail (*Coturnix coturnix japonica*)	*Recommended species include a wild waterfowl species, preferably the mallard (Anas platyrhynchos) or an upland game species, preferably the northern bobwhite (Colinus virginianus)*
Age at Study Initiation:	16 weeks old	Test birds should be at least 7 months (28 weeks) old. *Birds approaching their first breeding season should be used.*
Body Weight: (mean and range)	Males: Overall range (n=80) 91 to 132 g, with group means of 114 to 120 g. Females: Overall range (n=80) of 129 to 164 g, with group means of 146 to 152 g.	Body weights were recorded at the start of pre-treatment (-2 weeks), start of treatment (0 weeks), and at adult termination (6 weeks). *Body weights should be recorded at test initiation and at biweekly intervals up to week eight or up to the onset of egg laying and at termination.*
Source:	Wildlife International Ltd. Production Flock Easton, MD	*All birds should be from the same source.*

B. STUDY DESIGN:

1. Experimental Conditions

a. Range-finding study: None reported. The dietary concentrations were selected in consultation with the Sponsor and were based upon toxicity information provided by the Sponsor.

b. Definitive Study

Table 2: Experimental Parameters.

Parameter	Details	Remarks *Criteria*
Acclimation period:	8 weeks, followed by a 2-week pre-treatment period	The study author reported that at test initiation, all birds were examined for physical injuries and general health, and birds that did not appear healthy or were outside the desired weight range were excluded from the study. During acclimation, birds received 16 hours light/day.
Conditions (same as test or not):	Same as test	
Feeding:	Basal ration formulated to laboratory specifications by Agway Inc. and Easton public water, *ad libitum*	
Health (any mortality observed):	The birds appeared to be in good health at test initiation.	*Recommended observation period includes a 2-3 week health observation period prior to selection of birds for treatment. Generally, birds should be healthy without excess mortality. Feeding should be ad libitum, and sickness, injuries or mortality should be noted.*

Parameter	Details	Remarks *Criteria*
Test duration pre-laying exposure: egg-laying exposure: withdrawal period, if used:	N/A 6 weeks N/A	***Recommended pre-laying exposure duration:*** *At least 10 weeks prior to the onset of egg-laying.* ***Recommended exposure duration with egg-laying:*** *At least 10 weeks.* ***Recommended withdrawal period:*** *If reduced reproduction is evident, a withdrawal period of up to 3 weeks should be added to the test phase.*
Pen (for parental and offspring) size: construction materials: number:	Parents (one pair) were housed in battery cages measuring 27 x 51 x 20/25 cm high (sloping floors). Offspring (by set and group) were housed in 72 x 90 x 23 cm high battery brooders. Parental and offspring pens were constructed of vinyl-coated wire mesh. 20 parental pens/treatment level. Hatchlings were group-housed according to the appropriate parental concentration.	Pen floor size was significantly less (688 cm^2/quail) than recommended (at least 5000 cm^2/quail). *Pens* *Pens should have adequate room and be arranged to prevent cross-contamination.* *Materials* *Recommended materials include nontoxic material and nonbinding material, such as galvanized steel.* *Number* *At least 5 replicate pens should be used for mallards housed in groups of 7. For other arrangements, at least 12 pens should be used, but considerably more may be used if birds are kept in pairs. Chicks should be housed according to parental grouping.*
Number of birds per pen (male:female)	2 birds/pen (1 male:1 female)	*One male and one female per pen should be used. For quail, one male and two females should be used. For ducks, two males and five females should be used.*
Number of pens per group/treatment negative control: solvent control: treated:	20 pens N/A 20 pens/treatment	*At least 12-16 pens should be used, but considerably more if birds are kept in pairs.*

Parameter	Details	Remarks *Criteria*
Test concentrations (mg ai/kg diet) nominal: measured:	0 (negative control), 160, 400, or 1000 mg ai/kg diet <0.05 (<LOQ, control), 158, 387, and 982 mg ai/kg diet	Measured concentrations were determined at all levels on days 0 and 7 of Weeks 1 and 6. Mean-measured concentrations were reviewer-calculated from these results. *Recommended test concentrations include at least two concentrations other than the control; three or more will provide a better statistical analysis. The highest test concentrations should show a significant effect or be at or above the actual or expected field residue level.*
Maximum labeled field residue anticipated and source of information:	Not reported	*The highest test concentrations should show a significant effect or be at or above the actual or expected field residue level. The source (i.e., maximum label rate in lb ai/A and ppm), label registration no., label date, and site should be cited*]
Solvent/vehicle, if used type: amount:	N/A	*Recommended solvents include corn oil or other appropriate vehicle not more than 2% of diet by weight*
Was detailed description and nutrient analysis of the basal diet provided? (Yes/No)	Yes. The basal ration contained at least 27% protein and 2.5% fat, and no more than 5% fiber. The diet was supplemented with limestone, to increase the calcium level to approximately 3%.	Offspring were fed basal ration without the addition of limestone. *A commercial breeder feed or an equivalent that is appropriate for the test species is recommended.*

Parameter	Details	Remarks *Criteria*
Preparation of test diet	The appropriate amount of test material was combined with a portion of basal ration and mixed for approximately 10 minutes on a Hobart mixer. Two batches of premixes were prepared, 3 weeks apart. If not used immediately, the premixes were stored frozen in plastic bags. As needed, the appropriate premix was combined with additional basal ration and limestone and mixed in a Hobart mixer for approximately 10 minutes.	*A premixed diet containing the test substance should be mechanically mixed with basal diet. If an evaporative vehicle is used, it should be completely evaporated prior to feeding.*
Indicate whether stability and homogeneity of test material in diet determined (Yes/No)	Yes	
Were concentrations in diet verified by chemical analysis?	Yes	
Did chemical analysis confirm that diet was stable and homogeneous?	Yes Yes, marginally acceptable	Stability was assessed in treated feed prepared at all treatment levels after 7 days of ambient feeder storage during Week 1 and after 5 weeks of frozen storage followed by 7 days of ambient feeder storage during Week 6. For all samples, recoveries were 89-113% of initial concentrations. Homogeneity was assessed in treated feed prepared on Day 0 of Week 1 at all test levels. Six samples per level were collected: one sample per side from the top, middle, and bottom of the batch. Calculated coefficients of variations (CV=RSD) were 11.0, 9.3, and 5.6% for the 160, 400, and 1000 mg ai/kg diets, respectively.
Feeding and husbandry	Offspring were fed basal ration without the addition of limestone.	

Parameter	Details	Remarks *Criteria*
Test conditions (pre-laying) temperature: relative humidity: photoperiod:	23.8 ± 0.8°C 67 ± 13% 17 hr light/day	Light intensity was approximately 105 lux (approximately 10 foot candles). Test conditions reported for entire study period. As the study was only 6 weeks in duration, there was no pre-laying period included in the study design. *Recommended temperature: about 21EC (70EF)* *Recommended relative humidity: about 55%* *Recommended lighting* *First 8 weeks: 7 h per day.* *Thereafter: 16-17 h per day.* *At least 6 foot-candles are recommended at bird level.*
Egg Collection and Incubation		
Egg collection and storage collection interval: storage temperature: storage humidity:	Daily 13.4 ± 0.5°C 76 ± 7%	To prevent pathogen contamination, the collected eggs were fumigated with formaldehyde gas for approximately 2 hours. *Eggs should be collected daily; recommended egg storage temperature is approximately 16EC (61EF); recommended humidity is approximately 65%.* *Recommended collection interval: daily*
Were eggs candled for cracks prior to setting for incubation?	Yes	*Eggs should be candled on day 0*
Were eggs set weekly?	Yes	
When candling was done for fertility?	Eggs were candled on Days 7 (embryo viability) and 15 (embryo survival).	*Quail: approx. day 11* *Ducks: approx. day 14*
When the eggs were transferred to the hatcher?	Day 15	*Bobwhite: usually day 21* *Mallard: usually day 23*

Parameter	Details	Remarks *Criteria*
Hatching conditions temperature: humidity: photoperiod:	37.2 ± 0.0°C Approximately 77% 16 hours light/day (hatchlings)	*Recommended temperature is 39EC (102EF)* *Recommended humidity is 70%*
Day the hatched eggs were removed and counted	Days 18 or 19	*Eggs for bobwhite should be removed on day 24; for mallard on day 27*
Were egg shells washed and dried for at least 48 hrs before measuring?	Yes	
Egg shell thickness no. of eggs used: intervals: mode of measurement:	One egg was collected (when available) from each odd numbered cage during odd numbered weeks and from each even numbered cage during the even numbered weeks. Once weekly throughout the egg laying period. Five points around the equatorial circumference were measured to the nearest 0.002 mm.	Prior to egg shell thickness determination, egg shell strength was measured using a strength tester at the equator of the egg. *Newly hatched eggs should be collected at least once every two weeks. Thickness of the shell plus membrane should be measured to the nearest 0.01 mm* with 3 - 4 *measurements per shell.*
Reference chemical, if used	None used	

2. Observations:

Table 3: Observations.

Parameter	Details	Remarks
Parameters measured		
Parental (mortality, body weight, mean feed consumption) Egg collection and subsequent development (no. of eggs laid, no. of eggs cracked, shell thickness, no. of eggs set, no. of viable embryos, no. of live 3 week embryos, no. hatched, no. of 14-day survivors, average weight of 14-d old survivors, mortality, gross pathology, others)	- mortality - body weight - food consumption - signs of toxicity - necropsy - tissue weights - eggs laid - eggs cracked - egg shell strength - egg shell thickness - eggs set - viable embryos - live 2-week embryos - number of hatchlings - hatchling body weight - number of 14-day-old survivors - 14-day-old survivor body weight - signs of toxicity of hatchlings	All adult birds were subjected to gross necropsy. During necropsy, the wet weights of the liver, spleen, and gonads were recorded. *Recommended endpoints measured include:* • *Eggs laid/pen* • *Eggs cracked/pen* • *Eggs set/pen* • *Viable embryos/pen* • *Live 3-week embryos/pen* • *Normal hatchlings/pen* • *14-day-old survivors/pen* • *14-day-old survivors/pen* • *Weights of 14-day-old survivors (mean per pen)* • *Egg shell thickness* • *Food consumption (mean per pen)* • *Initial and final body weight (mean per pen)*
Indicate if the test material was regurgitated	No indications of dietary regurgitation.	
Observation intervals (for various parameters)	Parental and hatchling mortality and signs of toxicity were recorded once daily. Parental body weights were recorded at the start of the pre-treatment period (Week -2), at study initiation (Week 0), and at test termination (Week 6). Parental food consumption was measured weekly throughout the test.	*Body weights and food consumption should be measured at least biweekly*
Were raw data included?	Yes	

II. RESULTS AND DISCUSSION:

A. MORTALITY:

No mortalities occurred during the study in any test group. The NOAEC for adult mortality was 1000 mg ai/kg diet.

Table 4: Effect of Chlormequat Chloride on Mortality of Japanese Quail.

Treatment (mg ai/kg diet) Mean-measured (and Nominal) Concentrations	Observation Period					
	Week 1		Week 3		Week 6	
	No. Dead		No. Dead		No. Dead	
	Male	Female	Male	Female	Male	Female
Control	0	0	0	0	0	0
158 (160)	0	0	0	0	0	0
387 (400)	0	0	0	0	0	0
982 (1000)	0	0	0	0	0	0

B. REPRODUCTIVE AND OTHER ENDPOINTS:

Abnormal Effects/Behavior: No overt signs of toxicity were observed in any treatment group, and except for incidental clinical findings, all birds appeared normal throughout the study. Incidental clinical observations normally associated with pen wear and/or interactions among pen mates included foot, leg, head, neck or eye lesions, broken wing, feather loss, and bruising. Other clinical signs such as reduced reaction to external stimuli, ruffled appearance, wing droop, lethargy, depression, and lameness were also noted, and typically were associated with incidental injuries. The NOAEC for clinical signs of toxicity was 1000 mg ai/kg diet.

Food Consumption: No apparent treatment-related effects on feed consumption were reported. Numerous statistically-significant differences were observed during the study; however, the differences were slight and were neither consistent, nor concentration responsive. Additionally, statistically-significant reductions in feed consumption were noted during the pre-treatment period. Overall feed consumption during the exposure period averaged 19 g/bird/day for the control group, and 18 g/bird/day for all treatment level groups (reviewer-calculated). The NOAEC for feed consumption was determined by the study authors to be 1000 mg ai/kg diet.

Body Weight: No treatment-related effects on body weight were reported. A statistically-significant reduction in the mean body weight of males from the 400 mg ai/kg diet level was observed at study termination; however, the difference was slight, not concentration dependent, and evident prior to exposure to the treated diet (based on measurements at the start of the pre-treatment period). The NOAEC for adult body weight was determined by the study authors to be 1000 mg ai/kg diet.

Necropsy: There were no macroscopic findings at necropsy that were related to treatment.

There was a statistically-significant reduction compared to controls in testes weights of males from the 1000 mg ai/kg diet level (3.441 versus 4.107 g). Eleven of the 20 males from this group had testes weights more than one standard deviation below the control mean. Additionally, in six of those cases, the reduction in testes weight was correlated to a reduction in the number of viable embryos produced (as a percentage of eggs set). There was a slight statistically-significant reduction in the mean weight of oviducts from hens at the 160 mg ai/kg diet group compared to controls (5.519 versus 6.267 g). The reduction was primarily the result of data from three hens that had oviduct weights <2.2 g. When data from those hens were removed, the mean oviduct weight was 6.128, and comparable to the control group. Because the statistically-significant difference was not concentration responsive, and was isolated to three pens, the difference observed was not considered to be treatment-related. There were also slight, statistically-significant increases in the mean weight of livers from males in the 160 (2.642 g) and 1000 mg ai/kg diet (2.672 g) treatment groups compared to controls (2.359 g). Since the increases in liver weights were not concentration dependent, and both values were comparable to the mean historical control value of 2.807 g, the slight increases

observed were not considered related to treatment. No other statistically-significant differences were observed on assessed organ weights. Based on the reduced testes weight observed, the NOAEC for post-mortem findings was 400 mg ai/kg diet.

Reproductive Effects: No statistically-significant differences from controls were observed on any reproductive parameter for the 160 or 400 mg ai/kg diet levels. While not statistically-significant, there was a treatment-related reduction in viable embryos as a percentage of eggs set in the 1000 mg ai/kg diet treatment group compared to controls (67 versus 85%). The percentage of viable embryos produced in the 1000 mg ai/kg diet group declined from the second week of treatment until test termination. This reduction was also reflected as statistically-significant reductions in normal hatchlings and 14-day old survivors as percentages of eggs set, and the numbers of normal hatchlings and 14-day old survivors per hen per day. Egg shell strength and thickness were also statistically reduced compared to controls at the 1000 mg ai/kg diet level. No other statistically-significant differences from controls were observed on any other reproductive endpoint at the 1000 mg ai/kg diet level. Based on a treatment-related reduction in viable embryos and egg quality at the 1000 mg ai/kg level, the NOAEC for reproductive endpoints was 400 mg ai/kg diet.

Table 5: Reproductive and Other Parameters (nominal concentrations; study author-reported).

Parameter	Control	160 mg ai/kg	400 mg ai/kg	1000 mg ai/kg	NOAEC/ LOAEC
Eggs laid/pen	39	36	36	39	1000 mg ai/kg >1000 mg ai/kg
Eggs laid/hen/day	0.92	0.85	0.86	0.93	1000 mg ai/kg >1000 mg ai/kg
Eggs cracked	9	19	6	12	N/A
Eggs set	692	627	653	696	N/A
Shell thickness (mm ∀ SD)	0.223 ± 0.017	0.217 ± 0.013	0.218 ± 0.015	0.216 ± 0.013**	400 mg ai/kg 1000 mg ai/kg
Viable embryos	588	567	535	469[(a)]	N/A
Live 2-week embryos	572	559	522	460	N/A
No. of hatchling/hen/day	0.60	0.60	0.55	0.49**	400 mg ai/kg 1000 mg ai/kg
No. of normal hatchlings	522	513	469	423	N/A
Hatchling weight (g ± SD)	6.7 ± 0.5	6.7 ± 0.6	6.7 ± 0.5	6.7 ± 0.3	1000 mg ai/kg >1000 mg ai/kg
14-day old survivors	481	478	433	410	N/A
14-day old survivors weight (g ± SD)	38 ± 3	38 ± 4	37 ± 3	39 ± 4	1000 mg ai/kg >1000 mg ai/kg
Mean food consumption[(b)] (g/bird/day)	19	18	18	18	1000 mg ai/kg >1000 mg ai/kg
Weight (g) of parent females at Week -2:	150	149	148	152	1000 mg ai/kg

Parameter	Control	160 mg ai/kg	400 mg ai/kg	1000 mg ai/kg	NOAEC/ LOAEC
at test initiation: at test termination:	150 146	146 142	148 145	152 147	>1000 mg ai/kg
Weight (g) of parent males at Week -2: at test initiation: at test termination:	 120 120 122	 118 117 117	 114* 114 114**	 122 119 117	 1000 mg ai/kg >1000 mg ai/kg
Gross pathology	No treatment-related abnormalities observed.				1000 mg ai/kg >1000 mg ai/kg
Tissue Weight (g) of parent females Liver Spleen Oviduct	 5.467 0.040 6.267	 5.205 0.039 5.519*	 5.624 0.039 6.252	 6.137 0.036 6.185	 1000 mg ai/kg >1000 mg ai/kg
Tissue Weight (g) of parent males Liver Spleen Testes	 2.359 0.023 4.107	 2.642* 0.028 4.102	 2.533 0.024 3.755	 2.672** 0.026 3.441*	 400 mg ai/kg 1000 mg ai/kg

N/A = Not statistically-analyzed.
(a) Considered to be a treatment-related reduction.
(b) Reviewer-calculated.
* Statistically different from the control group at $p<0.05$ (Dunnett's t-test).
** Statistically different from the control group at $p<0.01$ (Dunnett's t-test).

C. REPORTED STATISTICS:

The following variables were statistically analyzed: adult body weight, adult feed consumption, tissue weights, eggs laid per hen per day, eggs cracked of eggs laid, viable embryos of eggs set, live 2-week embryos of viable embryos, hatchlings of live 2-week embryos, 14-day old survivors of hatchlings, normal hatchlings of eggs set, 14-day old survivors of eggs set, normal hatchlings per hen per day, 14-day old survivors per hen per day, egg shell thickness and egg strength, and offspring body weight.

Each of the treatment groups was compared to the control group using a one-tailed Dunnett's Multiple Comparison Procedure for body weight, feed consumption, and tissue weights, or Dunnett's test modified to incorporate co-variates for reproductive parameters and egg quality measurements (Dunnett-Hsu). Mean values of each treatment group were compared to the control group mean. Sample units were the individual pens within each experimental group, except adult body weights, where the sample unit was the individual bird. Percentage data were arcsine square root transformed prior to analysis. Nominal concentrations were used for all estimations.

D. VERIFICATION OF STATISTICAL RESULTS:

Statistical Method: Analysis was conducted using "chicks.sas" (Ver. 3; March 2002), a SAS program provided by EFED/OPP/USEPA. Data for all endpoints were examined graphically using box plots to determine if they exhibited a dose-dependent response, which was ultimately used to select the multiple comparison test to detect

LOAEC and NOAEC. Data for each endpoint were tested to determine if their distributions were normal and if their variances were homogeneous using Shapiro-Wilk's and Levene's tests, respectively. Data that satisfied these assumptions were subjected to Dunnett's and William's tests and data that did not satisfy these assumptions were subjected to the non-parametric MannWhitney-U (with a Bonferroni adjustment) and Jonckheere's tests. See Appendix I for output of reviewer's statistical verification and graphs for affected endpoints to support any reviewer-generated conclusions that may differ from those reported in the study.

NOAEC: <158 mg ai/kg diet
LOAEC: 158 mg ai/kg diet
Most Sensitive Endpoint(s): food consumption and male body weight gain

Table 6: Reproductive and Other Parameters (mean-measured concentrations; reviewer-reported).

Parameter	Control	158 mg ai/kg	387 mg ai/kg	982 mg ai/kg	NOAEC/ LOAEC
Eggs laid/pen	38.8	35.6	36.3	38.9	982 mg ai/kg >982 mg ai/kg
Eggs cracked/pen	0.95	0.95	0.3	0.6	982 mg ai/kg >982 mg ai/kg
Eggs not cracked/eggs laid (%)	97.6	97.3	99.1	98.4	982 mg ai/kg >982 mg ai/kg
Eggs set/pen	34.6	31.4	32.7	34.8	982 mg ai/kg >982 mg ai/kg
Shell thickness	0.22	0.22	0.22	0.22	982 mg ai/kg >982 mg ai/kg
Eggs set/eggs laid (%)	88.9	87.5	89.7	89.4	982 mg ai/kg >982 mg ai/kg
Viable embryos/pen	29.4	28.4	26.8	23.4	982 mg ai/kg >982 mg ai/kg
Viable embryos/eggs set (%)	84.9	90.5	81.7	67.1	982 mg ai/kg >982 mg ai/kg
Live embryos/pen	28.6	28.0	26.1	23.0	982 mg ai/kg >982 mg ai/kg
Live embryos/viable embryos (%)	96.6	98.7	97.4	98.0	982 mg ai/kg >982 mg ai/kg
No. of hatchlings/pen	25.2	25.2	23.1	20.8	982 mg ai/kg >982 mg ai/kg
No. of hatchlings/eggs laid (%)	64.5	70.6	62.6	53.3	982 mg ai/kg >982 mg ai/kg
No. of hatchlings/eggs set (%)	72.5	80.8	69.7	59.4*	387 mg ai/kg 982 mg ai/kg

No. of hatchlings/live embryos (%)	87.7	90.2	87.4	91.6	982 mg ai/kg >982 mg ai/kg
Hatchling survival/pen	24.1	23.9	21.7	20.5	982 mg ai/kg >982 mg ai/kg
Hatchling survival/eggs set (%)	69.1	76.2	65.2	58.7	982 mg ai/kg >982 mg ai/kg
Hatchling survival/no. of hatchlings (%)	94.7	94.3	92.8	99.0	982 mg ai/kg >982 mg ai/kg
Hatchling weight (g)	6.7	6.7	6.7	6.7	982 mg ai/kg >982 mg ai/kg
Survivor weight (g)	38.1	38.3	37.5	38.6	982 mg ai/kg >982 mg ai/kg
Mean food consumption (g/bird/day)	19.1	17.8*	17.8*	18.0*	<158 mg ai/kg 158 mg ai/kg
Male weight gain (g)	2.2	-1.0*	-0.4*	-4.5*	<158 mg ai/kg 158 mg ai/kg
Female weight gain (g)	-4.2	-7.2	-3.2	-5.3	982 mg ai/kg >982 mg ai/kg

*Statistically significant ($p<0.05$).

E. STUDY DEFICIENCIES:

There were no deficiencies that affected the scientific soundness of this study. However, several deficiencies from OPPTS 850.2300 guideline were observed. The most notable deviations were the use of Japanese quail and a treatment period of only 6 weeks. Other study deviations were considered minor. Although these deficiencies do not affect the scientific integrity of the study, this study does not fulfill guideline requirements.

F. REVIEWER=S COMMENTS:

Results of the reviewer's statistical verification differed from the study authors' for the adult non-reproductive endpoints. The reviewer's analysis detected significant reductions in food consumption and male weight gain at all treatment levels. The study authors' analysis did not detect these reductions, despite the calculation of identical treatment means. The reviewer's detection of significant adverse effects on number hatched of eggs set at the highest treatment level was supported by the study authors' findings. Additionally, the study authors' analysis detected significant reductions in other reproductive endpoints that the reviewer's analysis did not detect (e.g., eggshell thickness, male testes weights, 14-day old survivors as percentages of eggs set, and the numbers of normal hatchlings and 14-day old survivors per hen per day). Both the reviewer's and the study authors' results (based on measured concentrations) are provided in the Executive Summary and Conclusions sections.

Relative standard deviations (RSD) were calculated at each sampling interval for each concentration level. Generally, RSD values were <10% indicating that the test substance was incorporated homogenously into the basal feed. However, in several cases for the 160 and 400 mg ai/kg diets, RSD values exceeded the acceptable limit, ranging from 11.0-21.8%. If additional avian reproduction studies are required, it is recommended that additional steps be taken to ensure that the test material is evenly distributed in basal feed.

Test birds were acclimated to the facilities and study pens for 8 weeks prior to the start of the 2-week pretreatment period. All eggs laid were counted and selected eggs from each pen were incubated in order to identify successful pairs. Pairs used in the test had produced fertile eggs and had laid at least 2 eggs during the week of acclimation prior to the start of the pre-treatment period.

In the 1000 mg ai/kg diet group, the number of viable embryos as a percentage of eggs set during the pre-treatment period was reduced (<17%) in Pens 463 and 477, and outside the range of all other pens (40-100%) during the study. To remove any potential bias in interpretation of the production of viable embryos during the study, data were re-evaluated statistically by the study authors without the values from Pens 463 and 477. When these values were removed from statistical calculations, viable embryos as a percentage of eggs set during the pre-treatment and treatment periods were 87 and 74%, respectively. While 14-day old survivors as a percentage of eggs set and the number of 14-day old survivors per hen per day were no longer statistically significant, normal hatchlings as a percentage of eggs set and the number of normal hatchlings per hen per day were both statistically significant.

G. CONCLUSIONS:

This study is scientifically sound. However, due to considerable deviation from OPPT guidelines for an avian reproduction study, this study is classified as SUPPLEMENTAL.

NOAEC: <158 mg ai/kg diet
LOAEC: 158 mg ai/kg diet
Endpoint(s) Affected: food consumption and male body weight (most sensitive endpoints), , number of hatchlings of eggs set, and number of cracked eggs

III. REFERENCES:

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APPENDIX I. OUTPUT OF REVIEWER'S STATISTICAL VERIFICATION:

Japanese quail repro, Chlormequat chloride, MRID 467152-14
PRINTOUT OF RAW DATA

Obs	TRT	EL	EC	ENC_EL	ES	ES_EL	VE	VE_ES	LE	LE_VE	NH	NH_EL	NH_ES
1	Ctrl	31	0	100.00	23	74.19	21	91.30	20	95.24	16	51.61	69.57
2	Ctrl	41	0	100.00	39	95.12	39	100.00	38	97.44	37	90.24	94.87
3	Ctrl	42	2	95.24	36	85.71	35	97.22	35	100.00	34	80.95	94.44
4	Ctrl	42	1	97.62	39	92.86	18	46.15	18	100.00	17	40.48	43.59
5	Ctrl	42	0	100.00	38	90.48	36	94.74	36	100.00	34	80.95	89.47
6	Ctrl	35	3	91.43	30	85.71	20	66.67	16	80.00	14	40.00	46.67
7	Ctrl	36	0	100.00	32	88.89	29	90.63	29	100.00	25	69.44	78.13
8	Ctrl	40	0	100.00	38	95.00	30	78.95	29	96.67	22	55.00	57.89
9	Ctrl	42	4	90.48	34	80.95	29	85.29	29	100.00	29	69.05	85.29
10	Ctrl	38	1	97.37	35	92.11	34	97.14	33	97.06	30	78.95	85.71
11	Ctrl	37	1	97.30	32	86.49	28	87.50	28	100.00	25	67.57	78.13
12	Ctrl	42	0	100.00	40	95.24	40	100.00	40	100.00	38	90.48	95.00
13	Ctrl	33	1	96.97	27	81.82	21	77.78	17	80.95	15	45.45	55.56
14	Ctrl	37	1	97.30	34	91.89	29	85.29	29	100.00	27	72.97	79.41
15	Ctrl	43	0	100.00	39	90.70	25	64.10	25	100.00	21	48.84	53.85
16	Ctrl	41	5	87.80	34	82.93	32	94.12	32	100.00	30	73.17	88.24
17	Ctrl	38	0	100.00	34	89.47	33	97.06	33	100.00	23	60.53	67.65
18	Ctrl	41	0	100.00	39	95.12	31	79.49	29	93.55	16	39.02	41.03
19	Ctrl	34	0	100.00	30	88.24	21	70.00	19	90.48	16	47.06	53.33
20	Ctrl	41	0	100.00	39	95.12	37	94.87	37	100.00	36	87.80	92.31
21	Dose1	39	0	100.00	35	89.74	29	82.86	29	100.00	26	66.67	74.29
22	Dose1	43	3	93.02	38	88.37	34	89.47	34	100.00	32	74.42	84.21
23	Dose1	38	1	97.37	32	84.21	25	78.13	25	100.00	25	65.79	78.13
24	Dose1	42	0	100.00	40	95.24	32	80.00	31	96.88	25	59.52	62.50
25	Dose1	32	0	100.00	28	87.50	24	85.71	23	95.83	20	62.50	71.43
26	Dose1	41	1	97.56	38	92.68	38	100.00	36	94.74	30	73.17	78.95

27	Dose1	35	1	97.14	30	85.71	29	96.67	29	100.00	26	74.29
86.67												
28	Dose1	25	1	96.00	21	84.00	16	76.19	16	100.00	16	64.00
76.19												
29	Dose1	41	1	97.56	36	87.80	36	100.00	36	100.00	34	82.93
94.44												
30	Dose1	38	0	100.00	36	94.74	33	91.67	33	100.00	29	76.32
80.56												
31	Dose1	38	1	97.37	33	86.84	32	96.97	32	100.00	31	81.58
93.94												
32	Dose1	39	2	94.87	34	87.18	30	88.24	30	100.00	28	71.79
82.35												
33	Dose1	23	0	100.00	19	82.61	19	100.00	19	100.00	17	73.91
89.47												
34	Dose1	42	0	100.00	39	92.86	39	100.00	39	100.00	36	85.71
92.31												
35	Dose1	42	0	100.00	38	90.48	38	100.00	37	97.37	35	83.33
92.11												
36	Dose1	37	4	89.19	29	78.38	25	86.21	24	96.00	19	51.35
65.52												
37	Dose1	22	2	90.91	16	72.73	15	93.75	15	100.00	15	68.18
93.75												
38	Dose1	23	0	100.00	21	91.30	21	100.00	21	100.00	18	78.26
85.71												
39	Dose1	35	1	97.14	30	85.71	29	96.67	28	96.55	26	74.29
86.67												
40	Dose1	37	1	97.30	34	91.89	23	67.65	22	95.65	16	43.24
47.06												
41	Dose2	34	2	94.12	28	82.35	25	89.29	21	84.00	16	47.06
57.14												
42	Dose2	34	0	100.00	31	91.18	28	90.32	28	100.00	27	79.41
87.10												
43	Dose2	30	0	100.00	27	90.00	17	62.96	17	100.00	13	43.33
48.15												
44	Dose2	42	1	97.62	38	90.48	36	94.74	36	100.00	31	73.81
81.58												
45	Dose2	39	0	100.00	36	92.31	32	88.89	31	96.88	31	79.49
86.11												
46	Dose2	34	0	100.00	31	91.18	30	96.77	30	100.00	27	79.41
87.10												
47	Dose2	21	1	95.24	16	76.19	12	75.00	12	100.00	9	42.86
56.25												
48	Dose2	37	0	100.00	33	89.19	27	81.82	26	96.30	24	64.86
72.73												
49	Dose2	37	0	100.00	34	91.89	33	97.06	33	100.00	29	78.38
85.29												
50	Dose2	37	1	97.30	33	89.19	27	81.82	26	96.30	23	62.16
69.70												
51	Dose2	42	0	100.00	39	92.86	38	97.44	38	100.00	35	83.33
89.74												
52	Dose2	37	0	100.00	34	91.89	7	20.59	7	100.00	6	16.22
17.65												
53	Dose2	38	0	100.00	35	92.11	23	65.71	20	86.96	16	42.11
45.71												
54	Dose2	27	0	100.00	24	88.89	23	95.83	22	95.65	16	59.26
66.67												

```
55  Dose2 38  0  100.00  34  89.47  21   61.76   21  100.00  21  55.26
61.76
56  Dose2 42  0  100.00  38  90.48  38  100.00   38  100.00  36  85.71
94.74
57  Dose2 40  0  100.00  37  92.50  32   86.49   31   96.88  28  70.00
75.68
58  Dose2 35  0  100.00  31  88.57  30   96.77   30  100.00  20  57.14
64.52
59  Dose2 41  0  100.00  38  92.68  31   81.58   31  100.00  31  75.61
81.58
60  Dose2 40  1   97.50  36  90.00  25   69.44   24   96.00  23  57.50
63.89
61  Dose3 42  0  100.00  39  92.86  27   69.23   27  100.00  26  61.90
66.67
62  Dose3 42  0  100.00  39  92.86  32   82.05   32  100.00  31  73.81
79.49
63  Dose3 40  0  100.00  37  92.50   1    2.70    1  100.00   1   2.50
2.70
64  Dose3 33  1   96.97  26  78.79  26  100.00   24   92.31  23  69.70
88.46
65  Dose3 40  1   97.50  35  87.50  33   94.29   33  100.00  31  77.50
88.57
66  Dose3 38  2   94.74  33  86.84   4   12.12    4  100.00   4  10.53
12.12
67  Dose3 36  0  100.00  33  91.67  33  100.00   33  100.00  30  83.33
90.91
68  Dose3 39  0  100.00  35  89.74  29   82.86   28   96.55  22  56.41
62.86
69  Dose3 41  0  100.00  38  92.68  38  100.00   38  100.00  32  78.05
84.21
70  Dose3 37  5   86.49  29  78.38   5   17.24    5  100.00   5  13.51
17.24
71  Dose3 41  0  100.00  37  90.24  21   56.76   20   95.24  18  43.90
48.65
72  Dose3 42  0  100.00  39  92.86  37   94.87   37  100.00  34  80.95
87.18
73  Dose3 40  2   95.00  34  85.00  23   67.65   22   95.65  20  50.00
58.82
74  Dose3 38  0  100.00  35  92.11  35  100.00   34   97.14  29  76.32
82.86
75  Dose3 36  0  100.00  33  91.67  27   81.82   27  100.00  26  72.22
78.79
76  Dose3 33  0  100.00  30  90.91  19   63.33   18   94.74  15  45.45
50.00
77  Dose3 38  0  100.00  35  92.11   0    0.00    0       .   0   0.00
0.00
78  Dose3 40  1   97.50  36  90.00  15   41.67   14   93.33  13  32.50
36.11
79  Dose3 39  0  100.00  35  89.74  34   97.14   34  100.00  31  79.49
88.57
80  Dose3 42  0  100.00  38  90.48  30   78.95   29   96.67  24  57.14
63.16
Japanese quail repro, Chlormequat chloride, MRID 467152-14
PRINTOUT OF RAW DATA (continued)
Obs TRT   NH_LE   HS   HS_ES   HS_NH THICK HATWT  SURVWT   FOOD  WTGAINM
WTGAINF
1   Ctrl   80.00  16   69.57  100.00   0.22    7     37      20      15     -1
```

2	Ctrl	97.37	37	94.87	100.00	0.23	7	42	18	5	-3
3	Ctrl	97.14	33	91.67	97.06	0.21	6	37	18	0	-12
4	Ctrl	94.44	17	43.59	100.00	0.24	6	36	21	4	-3
5	Ctrl	94.44	30	78.95	88.24	0.21	6	35	18	3	-5
6	Ctrl	87.50	14	46.67	100.00	0.23	7	39	19	-1	-9
7	Ctrl	86.21	24	75.00	96.00	0.23	7	43	20	-1	-8
8	Ctrl	75.86	16	42.11	72.73	0.22	6	36	19	-3	-6
9	Ctrl	100.00	27	79.41	93.10	0.20	6	34	19	4	-4
10	Ctrl	90.91	29	82.86	96.67	0.23	6	37	17	4	-4
11	Ctrl	89.29	25	78.13	100.00	0.20	7	37	18	-2	-3
12	Ctrl	95.00	38	95.00	100.00	0.24	8	41	20	-2	0
13	Ctrl	88.24	13	48.15	86.67	0.20	7	39	21	6	-11
14	Ctrl	93.10	28	82.35	103.70	0.23	7	36	18	0	-8
15	Ctrl	84.00	20	51.28	95.24	0.22	7	39	18	0	-10
16	Ctrl	93.75	29	85.29	96.67	0.21	6	36	19	-2	-3
17	Ctrl	69.70	22	64.71	95.65	0.26	6	39	19	2	2
18	Ctrl	55.17	15	38.46	93.75	0.25	8	46	21	0	8
19	Ctrl	84.21	13	43.33	81.25	0.23	6	35	17	6	-5
20	Ctrl	97.30	35	89.74	97.22	0.21	7	37	21	5	1
21	Dose1	89.66	25	71.43	96.15	0.23	7	40	18	0	-4
22	Dose1	94.12	31	81.58	96.88	0.23	7	44	18	-6	-4
23	Dose1	100.00	23	71.88	92.00	0.20	7	33	18	6	-6
24	Dose1	80.65	25	62.50	100.00	0.22	6	34	18	-2	-5
25	Dose1	86.96	19	67.86	95.00	0.22	6	38	17	-3	-4
26	Dose1	83.33	26	68.42	86.67	0.21	6	36	17	2	-5
27	Dose1	89.66	25	83.33	96.15	0.22	6	38	16	-4	-6
28	Dose1	100.00	16	76.19	100.00	0.18	6	38	16	0	-23
29	Dose1	94.44	31	86.11	91.18	0.22	7	40	19	0	-2
30	Dose1	87.88	27	75.00	93.10	0.23	6	38	17	1	3
31	Dose1	96.88	30	90.91	96.77	0.22	7	44	19	3	-4
32	Dose1	93.33	25	73.53	89.29	0.22	7	40	19	-1	-4
33	Dose1	89.47	15	78.95	88.24	0.22	6	33	15	-3	-28
34	Dose1	92.31	37	94.87	102.78	0.22	7	37	18	-3	-6
35	Dose1	94.59	35	92.11	100.00	0.24	8	40	18	-3	-4
36	Dose1	79.17	18	62.07	94.74	0.21	7	38	21	-1	-8
37	Dose1	100.00	11	68.75	73.33	0.21	7	41	15	0	-20
38	Dose1	85.71	19	90.48	105.56	0.22	7	45	21	-7	1
39	Dose1	92.86	26	86.67	100.00	0.23	6	39	19	-1	-10
40	Dose1	72.73	14	41.18	87.50	0.19	5	29	16	1	-5
41	Dose2	76.19	14	50.00	87.50	0.21	7	38	16	2	0
42	Dose2	96.43	27	87.10	100.00	0.20	6	40	17	-3	-1
43	Dose2	76.47	9	33.33	69.23	0.23	6	36	16	-4	-3
44	Dose2	86.11	31	81.58	100.00	0.23	7	38	20	3	-5
45	Dose2	100.00	29	80.56	93.55	0.23	6	38	16	1	-1
46	Dose2	90.00	27	87.10	100.00	0.23	8	38	17	-1	-20
47	Dose2	75.00	9	56.25	100.00	0.21	7	38	16	2	-1
48	Dose2	92.31	24	72.73	100.00	0.20	7	39	17	-3	-8
49	Dose2	87.88	27	79.41	93.10	0.22	7	39	19	1	-4
50	Dose2	88.46	20	60.61	86.96	0.23	6	34	18	-2	-3
51	Dose2	92.11	34	87.18	97.14	0.20	6	32	16	-2	-1
52	Dose2	85.71	6	17.65	100.00	0.20	7	35	19	5	10
53	Dose2	80.00	15	42.86	93.75	0.22	7	32	19	0	-9
54	Dose2	72.73	16	66.67	100.00	0.21	7	35	16	-3	-9
55	Dose2	100.00	14	41.18	66.67	0.22	7	39	18	3	-1
56	Dose2	94.74	36	94.74	100.00	0.25	7	43	20	1	-11
57	Dose2	90.32	27	72.97	96.43	0.21	7	37	18	-4	0
58	Dose2	66.67	15	48.39	75.00	0.20	7	37	17	-4	14

59	Dose2	100.00	30	78.95	96.77	0.24	6	38	18	-4	-1
60	Dose2	95.83	23	63.89	100.00	0.22	7	44	22	4	-9
61	Dose3	96.30	27	69.23	103.85	0.22	7	37	17	-5	-2
62	Dose3	96.88	31	79.49	100.00	0.21	6	38	17	2	-6
63	Dose3	100.00	1	2.70	100.00	0.22	7	46	20	5	-3
64	Dose3	95.83	23	88.46	100.00	0.23	7	40	19	-8	-7
65	Dose3	93.94	30	85.71	96.77	0.23	7	32	18	-1	-7
66	Dose3	100.00	4	12.12	100.00	0.20	7	45	16	-34	-9
67	Dose3	90.91	29	87.88	96.67	0.21	7	38	18	1	-9
68	Dose3	78.57	22	62.86	100.00	0.21	6	40	17	-1	-7
69	Dose3	84.21	31	81.58	96.88	0.23	6	36	18	2	-5
70	Dose3	100.00	5	17.24	100.00	0.19	7	41	19	3	11
71	Dose3	90.00	16	43.24	88.89	0.23	7	41	18	-9	-3
72	Dose3	91.89	34	87.18	100.00	0.21	7	39	18	-8	-3
73	Dose3	90.91	21	61.76	105.00	0.20	7	33	18	0	-6
74	Dose3	85.29	29	82.86	100.00	0.22	6	39	17	-2	-6
75	Dose3	96.30	26	78.79	100.00	0.22	7	38	20	-1	-2
76	Dose3	83.33	14	46.67	93.33	0.23	6	35	18	-2	-8
77	Dose3	.	0	0.00	.	0.22	.	.	15	-14	-12
78	Dose3	92.86	14	38.89	107.69	0.21	7	34	18	-4	-8
79	Dose3	91.18	31	88.57	100.00	0.24	7	46	20	-2	-8
80	Dose3	82.76	22	57.89	91.67	0.21	7	35	18	-12	-6

Japanese quail repro, Chlormequat chloride, MRID 467152-14

ANALYSIS RESULTS FOR VARIABLE EL (Eggs Laid)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.898	<.001	4.372	0.007	USE NON-PARAMETRIC TESTS

****

BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval
Ctrl	20	38.80	3.53	0.79	9.11	37.15, 40.45
Dose1	20	35.60	6.92	1.55	19.43	32.36, 38.84
Dose2	20	36.25	5.33	1.19	14.70	33.76, 38.74
Dose3	20	38.85	2.76	0.62	7.10	37.56, 40.14

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	40.50	31.00	43.00	.	.
Dose1	38.00	22.00	43.00	91.75	8.25
Dose2	37.00	21.00	42.00	93.43	6.57
Dose3	39.50	33.00	42.00	100.13	-0.13

****

NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	4.23	0.238

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	40.50	.	.
Dose1	38.00	0.349	0.110
Dose2	37.00	0.174	0.060
Dose3	39.50	1.000	0.426

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE NEG_EC (Eggs Cracked)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.765	<.001	1.958	0.127	USE NON-PARAMETRIC TESTS

****
**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval
Ctrl	20	0.95	1.47	0.33	154.53	0.26, 1.64
Dose1	20	0.95	1.10	0.25	115.69	0.44, 1.46
Dose2	20	0.30	0.57	0.13	190.41	0.03, 0.57
Dose3	20	0.60	1.23	0.28	205.20	0.02, 1.18

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	0.00	0.00	5.00	.	.
Dose1	1.00	0.00	4.00	100.00	0.00
Dose2	0.00	0.00	2.00	31.58	68.42
Dose3	0.00	0.00	5.00	63.16	36.84

****
**
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	5.93	0.115

MannWhit(Bon) - testing each trt median signif. greater than control
Jonckheere - test assumes dose-response relationship, testing positive trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	0.00	.	.
Dose1	1.00	0.829	0.270
Dose2	0.00	1.000	0.938
Dose3	0.00	1.000	0.952

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE ENC_EL ((EL-EC)/EL (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.784	<.001	1.386	0.254	USE NON-PARAMETRIC TESTS

****
**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	20	97.57	3.66	0.82	3.75	95.86,	99.29
Dose1	20	97.27	3.17	0.71	3.26	95.79,	98.76
Dose2	20	99.09	1.78	0.40	1.79	98.26,	99.92
Dose3	20	98.41	3.30	0.74	3.35	96.87,	99.95

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	100.00	87.80	100.00	.	.
Dose1	97.46	89.19	100.00	99.69	0.31
Dose2	100.00	94.12	100.00	101.55	-1.55
Dose3	100.00	86.49	100.00	100.86	-0.86

****
**
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	6.03	0.110

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	100.00	.	.
Dose1	97.46	0.757	0.246
Dose2	100.00	1.000	0.931
Dose3	100.00	1.000	0.951

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

```
Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE ES  ( Eggs Set )

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-
level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric
analyses.
  Shapiro-Wilks  Shapiro-Wilks    Levenes    Levenes   Conclusion
    Test Stat      P-value       Test Stat   P-value
      0.920         <.001          3.121      0.031    USE NON-PARAMETRIC
TESTS

*****************************************************************************
**
BASIC SUMMARY STATISTICS
 Level  N     Mean     StdDev      StdErr    Coef of Var    95% Conf.Interval
  Ctrl  20    34.60      4.59        1.03       13.27          32.45,   36.75
  Dose1 20    31.35      7.12        1.59       22.70          28.02,   34.68
  Dose2 20    32.65      5.58        1.25       17.10          30.04,   35.26
  Dose3 20    34.80      3.47        0.78        9.98          33.17,   36.43

 Level       Median      Min        Max     %of Control(means)
%Reduction(means)
  Ctrl        34.50    23.00      40.00          .                .
  Dose1       33.50    16.00      40.00        90.61              9.39
  Dose2       34.00    16.00      39.00        94.36              5.64
  Dose3       35.00    26.00      39.00       100.58             -0.58

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**
NON-PARAMETRIC ANALYSES     - use alpha-level=0.05 for all tests
    Kruskal-Wallis test - equality among treatment groups
     Degrees of Freedom   TestStat    P-value
           3                3.72       0.293

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

 Level     Median      MannWhit(Bon adjust)p-value    Jonckheere p-value
  Ctrl      34.50                  .                        .
  Dose1     33.50                0.225                    0.069
  Dose2     34.00                0.327                    0.114
  Dose3     35.00                1.000                    0.512

 SUMMARY                      NOEC            LOEC
   MannWhit (Bonf adjust)     Dose3           >highest dose
   Jonckheere                 Dose3           >highest dose
```

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Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE ES_EL  ( EggsSet/EggsLaid (%) )

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-
level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric
analyses.
  Shapiro-Wilks  Shapiro-Wilks    Levenes    Levenes   Conclusion
    Test Stat      P-value       Test Stat   P-value
      0.895         <.001          1.711      0.172    USE NON-PARAMETRIC
TESTS

*********************************************************************
**
BASIC SUMMARY STATISTICS
 Level  N     Mean     StdDev      StdErr    Coef of Var    95% Conf.Interval
  Ctrl  20    88.90      5.74        1.28        6.46          86.21,   91.59
  Dose1 20    87.50      5.49        1.23        6.27          84.93,   90.07
  Dose2 20    89.67      3.93        0.88        4.38          87.83,   91.51
  Dose3 20    89.45      4.29        0.96        4.79          87.44,   91.45

 Level       Median      Min        Max     %of Control(means)
%Reduction(means)
  Ctrl         89.97    74.19      95.24          .                .
  Dose1        87.65    72.73      95.24        98.42             1.58
  Dose2        90.48    76.19      92.86       100.86            -0.86
  Dose3        90.69    78.38      92.86       100.61            -0.61

*********************************************************************
**
NON-PARAMETRIC ANALYSES    - use alpha-level=0.05 for all tests
    Kruskal-Wallis test - equality among treatment groups
     Degrees of Freedom   TestStat    P-value
            3               2.60       0.458

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

 Level      Median      MannWhit(Bon adjust)p-value    Jonckheere p-value
  Ctrl       89.97                  .                        .
  Dose1      87.65                0.555                    0.179
  Dose2      90.48                1.000                    0.663
  Dose3      90.69                1.000                    0.802

 SUMMARY                      NOEC            LOEC
   MannWhit (Bonf adjust)     Dose3           >highest dose
   Jonckheere                 Dose3           >highest dose
```

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE VE (Viable Embryo(d14))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.951	0.004	3.525	0.019	USE NON-PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	20	29.40	6.62	1.48	22.52	26.30,	32.50
Dose1	20	28.35	7.20	1.61	25.39	24.98,	31.72
Dose2	20	26.75	8.09	1.81	30.25	22.96,	30.54
Dose3	20	23.45	12.29	2.75	52.42	17.70,	29.20

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	29.50	18.00	40.00	.	.
Dose1	29.00	15.00	39.00	96.43	3.57
Dose2	27.50	7.00	38.00	90.99	9.01
Dose3	27.00	0.00	38.00	79.76	20.24

****
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	2.10	0.551

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	29.50	.	.
Dose1	29.00	1.000	0.347
Dose2	27.50	0.565	0.179
Dose3	27.00	0.302	0.072

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

```
Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE VE_ES  ( ViableEmbryo/EggsSet (%) )

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-
level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric
analyses.
  Shapiro-Wilks   Shapiro-Wilks    Levenes    Levenes   Conclusion
    Test Stat       P-value       Test Stat   P-value
      0.885          <.001          9.293      <.001    USE NON-PARAMETRIC
TESTS

*****************************************************************************
**
BASIC SUMMARY STATISTICS
 Level  N     Mean     StdDev      StdErr    Coef of Var    95% Conf.Interval
  Ctrl  20    84.92     14.27       3.19       16.81          78.23,   91.60
  Dose1 20    90.51      9.65       2.16       10.66          85.99,   95.02
  Dose2 20    81.71     18.89       4.22       23.12          72.87,   90.56
  Dose3 20    67.13     34.41       7.70       51.26          51.03,   83.24

 Level       Median      Min       Max    %of Control(means)
%Reduction(means)
  Ctrl        89.06    46.15     100.00          .                .
  Dose1       92.71    67.65     100.00       106.59             -6.59
  Dose2       87.69    20.59     100.00        96.23              3.77
  Dose3       80.38     0.00     100.00        79.06             20.94

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**
NON-PARAMETRIC ANALYSES    - use alpha-level=0.05 for all tests
    Kruskal-Wallis test - equality among treatment groups
     Degrees of Freedom   TestStat    P-value
           3                5.76       0.124

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

 Level     Median      MannWhit(Bon adjust)p-value    Jonckheere p-value
  Ctrl      89.06                    .                        .
  Dose1     92.71                  1.000                    0.899
  Dose2     87.69                  0.958                    0.332
  Dose3     80.38                  0.345                    0.052

 SUMMARY                        NOEC            LOEC
   MannWhit (Bonf adjust)       Dose3           >highest dose
   Jonckheere                   Dose3           >highest dose
```

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE LE (Live Embryo(d21))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.958	0.010	3.200	0.028	USE NON-PARAMETRIC TESTS

****
**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	20	28.60	7.33	1.64	25.63	25.17,	32.03
Dose1	20	27.95	7.07	1.58	25.31	24.64,	31.26
Dose2	20	26.10	8.25	1.84	31.59	22.24,	29.96
Dose3	20	23.00	12.25	2.74	53.27	17.27,	28.73

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	29.00	16.00	40.00	.	.
Dose1	29.00	15.00	39.00	97.73	2.27
Dose2	27.00	7.00	38.00	91.26	8.74
Dose3	27.00	0.00	38.00	80.42	19.58

****
**
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	2.03	0.566

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	29.00	.	.
Dose1	29.00	1.000	0.393
Dose2	27.00	0.691	0.206
Dose3	27.00	0.301	0.080

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE LE_VE (LiveEmbryo/ViableEmbryo (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.735	<.001	3.070	0.033	USE NON-PARAMETRIC TESTS

****
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	20	96.57	6.11	1.37	6.32	93.71,	99.43
Dose1	20	98.65	1.95	0.44	1.98	97.74,	99.56
Dose2	20	97.45	4.46	1.00	4.58	95.36,	99.53
Dose3	19	97.98	2.65	0.61	2.71	96.70,	99.26

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	100.00	80.00	100.00	.	.
Dose1	100.00	94.74	100.00	102.16	-2.16
Dose2	100.00	84.00	100.00	100.91	-0.91
Dose3	100.00	92.31	100.00	101.46	-1.46

****
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	0.55	0.907

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	100.00	.	.
Dose1	100.00	1.000	0.723
Dose2	100.00	1.000	0.556
Dose3	100.00	1.000	0.427

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE NH (Number Hatched)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.961	0.015	1.875	0.141	USE PARAMETRIC TESTS

****
**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	20	25.25	8.02	1.79	31.76	21.50,	29.00
Dose1	20	25.20	6.79	1.52	26.93	22.02,	28.38
Dose2	20	23.10	8.41	1.88	36.41	19.16,	27.04
Dose3	20	20.75	10.99	2.46	52.95	15.61,	25.89

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	25.00	14.00	38.00	.	.
Dose1	26.00	15.00	36.00	99.80	0.20
Dose2	23.50	6.00	36.00	91.49	8.51
Dose3	23.50	0.00	34.00	82.18	17.82

****
**
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	76	1.21	0.313

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	25.25	.	25.25	.	1.000	0.862	0.364	.	.
Dose1	25.20	0.743	25.20	0.576	.	0.870	0.374	.	.
Dose2	23.10	0.416	23.10	0.279	.	.	0.828	.	.
Dose3	20.75	0.124	20.75	0.067	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE NH_EL (NumberHatched/EggsLaid (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.950	0.003	6.423	<.001	USE NON-PARAMETRIC TESTS

****
**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	20	64.48	17.54	3.92	27.20	56.27,	72.69
Dose1	20	70.56	10.79	2.41	15.29	65.51,	75.61
Dose2	20	62.65	17.94	4.01	28.63	54.25,	71.04
Dose3	20	53.26	27.77	6.21	52.14	40.26,	66.26

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	68.31	39.02	90.48	.	.
Dose1	73.54	43.24	85.71	109.44	-9.44
Dose2	63.51	16.22	85.71	97.16	2.84
Dose3	59.52	0.00	83.33	82.60	17.40

****
**
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	4.00	0.261

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	68.31	.	.
Dose1	73.54	1.000	0.863
Dose2	63.51	1.000	0.441
Dose3	59.52	0.545	0.104

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE NH_ES (NumberHatched/EggsSet (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.941	0.001	6.268	<.001	USE NON-PARAMETRIC TESTS

****
**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	20	72.51	18.65	4.17	25.72	63.78, 81.23
Dose1	20	80.81	12.22	2.73	15.12	75.09, 86.53
Dose2	20	69.65	18.77	4.20	26.95	60.87, 78.44
Dose3	20	59.37	30.64	6.85	51.61	45.03, 73.71

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	78.13	41.03	95.00	.	.
Dose1	83.28	47.06	94.44	111.46	-11.46
Dose2	71.21	17.65	94.74	96.07	3.93
Dose3	64.91	0.00	90.91	81.88	18.12

****
**
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	6.20	0.102

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	78.13	.	.
Dose1	83.28	1.000	0.872
Dose2	71.21	1.000	0.264
Dose3	64.91	0.370	0.044

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	**Dose2**	**Dose3**

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE NH_LE (NumberHatched/LiveEmbryo (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.935	<.001	1.551	0.208	USE NON-PARAMETRIC TESTS

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**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	20	87.68	10.90	2.44	12.44	82.58,	92.78
Dose1	20	90.19	7.29	1.63	8.08	86.78,	93.60
Dose2	20	87.35	9.86	2.21	11.29	82.73,	91.96
Dose3	19	91.64	6.34	1.45	6.92	88.58,	94.69

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	90.10	55.17	100.00	.	.
Dose1	90.98	72.73	100.00	102.86	-2.86
Dose2	89.23	66.67	100.00	99.62	0.38
Dose3	91.89	78.57	100.00	104.51	-4.51

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**
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	1.77	0.621

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	90.10	.	.
Dose1	90.98	1.000	0.653
Dose2	89.23	1.000	0.383
Dose3	91.89	1.000	0.746

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE HS (Hatching Survival(d14))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.967	0.035	1.843	0.146	USE PARAMETRIC TESTS

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**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	20	24.05	8.27	1.85	34.38	20.18, 27.92
Dose1	20	23.90	7.06	1.58	29.52	20.60, 27.20
Dose2	20	21.65	8.88	1.98	40.99	17.50, 25.80
Dose3	20	20.50	10.88	2.43	53.07	15.41, 25.59

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	24.50	13.00	38.00	.	.
Dose1	25.00	11.00	37.00	99.38	0.62
Dose2	23.50	6.00	36.00	90.02	9.98
Dose3	22.50	0.00	34.00	85.24	14.76

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**
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	76	0.77	0.515

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	24.05	.	24.05	.	1.000	0.828	0.588	.	.
Dose1	23.90	0.730	23.90	0.560	.	0.854	0.622	.	.
Dose2	21.65	0.384	21.65	0.253	.	.	0.977	.	.
Dose3	20.50	0.227	20.50	0.137	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE HS_ES (HatchingSurvival/EggsSet (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.945	0.002	5.841	0.001	USE NON-PARAMETRIC TESTS

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**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	20	69.06	19.84	4.44	28.73	59.77, 78.34
Dose1	20	76.19	12.91	2.89	16.94	70.15, 82.23
Dose2	20	65.16	20.90	4.67	32.08	55.37, 74.94
Dose3	20	58.66	30.35	6.79	51.74	44.45, 72.86

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	76.56	38.46	95.00	.	.
Dose1	75.60	41.18	94.87	110.33	-10.33
Dose2	69.70	17.65	94.74	94.35	5.65
Dose3	66.04	0.00	88.57	84.94	15.06

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**
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	3.43	0.329

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	76.56	.	.
Dose1	75.60	0.704	0.772
Dose2	69.70	0.846	0.240
Dose3	66.04	0.599	0.095

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE HS_NH (HatchingSurvival/NumberHatched (%))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.849	<.001	2.804	0.045	USE NON-PARAMETRIC TESTS

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BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	20	94.70	7.42	1.66	7.83	91.23,	98.17
Dose1	20	94.27	7.15	1.60	7.58	90.92,	97.61
Dose2	20	92.81	10.60	2.37	11.42	87.85,	97.76
Dose3	19	98.99	4.40	1.01	4.44	96.87,	100.00

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	96.67	72.73	103.70	.	.
Dose1	95.58	73.33	105.56	99.55	0.45
Dose2	96.96	66.67	100.00	98.00	2.00
Dose3	100.00	88.89	107.69	104.53	-4.53

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NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	7.44	0.059

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	96.67	.	.
Dose1	95.58	0.939	0.307
Dose2	96.96	1.000	0.451
Dose3	100.00	1.000	0.976

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE THICK (Eggshell thickness)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.989	0.704	1.296	0.282	USE PARAMETRIC TESTS

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**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	20	0.22	0.02	0.00	7.65	0.21,	0.23
Dose1	20	0.22	0.01	0.00	6.20	0.21,	0.22
Dose2	20	0.22	0.01	0.00	6.61	0.21,	0.22
Dose3	20	0.22	0.01	0.00	5.90	0.21,	0.22

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	0.22	0.20	0.26	.	.
Dose1	0.22	0.18	0.24	97.53	2.47
Dose2	0.22	0.20	0.25	97.82	2.18
Dose3	0.22	0.19	0.24	97.08	2.92

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**
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	76	0.79	0.501

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	0.22	.	0.22	.	0.629	0.716	0.493	.	.
Dose1	0.22	0.249	0.22	0.157	.	0.999	0.996	.	.
Dose2	0.22	0.302	0.22	0.167	.	.	0.984	.	.
Dose3	0.22	0.180	0.22	0.104	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE HATWT (Hatchling Weight)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.986	0.567	2.683	0.053	USE PARAMETRIC TESTS

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**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval
Ctrl	20	6.70	0.52	0.12	7.75	6.46, 6.94
Dose1	20	6.66	0.58	0.13	8.72	6.39, 6.93
Dose2	20	6.73	0.54	0.12	7.97	6.48, 6.98
Dose3	19	6.72	0.32	0.07	4.82	6.56, 6.88

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	6.80	5.90	7.70	.	.
Dose1	6.55	5.40	7.60	99.40	0.60
Dose2	6.85	5.60	7.60	100.45	-0.45
Dose3	6.70	6.20	7.40	100.31	-0.31

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**
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	75	0.08	0.972

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	6.70	.	6.70	.	0.994	0.998	0.999	.	.
Dose1	6.66	0.652	6.70	0.590	.	0.971	0.981	.	.
Dose2	6.73	0.814	6.70	0.625	.	.	1.000	.	.
Dose3	6.72	0.796	6.70	0.643	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE SURVWT (Survivor Wt (d14))

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.977	0.158	0.730	0.537	USE PARAMETRIC TESTS

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**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.	Interval
Ctrl	20	38.05	3.02	0.67	7.93	36.64,	39.46
Dose1	20	38.25	3.96	0.89	10.35	36.40,	40.10
Dose2	20	37.50	3.03	0.68	8.09	36.08,	38.92
Dose3	19	38.58	4.07	0.93	10.56	36.62,	40.54

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	37.00	34.00	46.00	.	.
Dose1	38.00	29.00	45.00	100.53	-0.53
Dose2	38.00	32.00	44.00	98.55	1.45
Dose3	38.00	32.00	46.00	101.39	-1.39

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**
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	75	0.32	0.812

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	38.05	.	38.15	.	0.998	0.961	0.966	.	.
Dose1	38.25	0.811	38.15	0.621	.	0.909	0.991	.	.
Dose2	37.50	0.548	38.03	0.608	.	.	0.778	.	.
Dose3	38.58	0.887	38.03	0.627	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	Dose3	>highest dose
Williams	Dose3	>highest dose

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE FOOD (Food Consumption)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.973	0.087	1.185	0.321	USE PARAMETRIC TESTS

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**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf. Interval
Ctrl	20	19.05	1.32	0.29	6.91	18.43, 19.67
Dose1	20	17.75	1.68	0.38	9.48	16.96, 18.54
Dose2	20	17.75	1.68	0.38	9.48	16.96, 18.54
Dose3	20	17.95	1.28	0.29	7.11	17.35, 18.55

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	19.00	17.00	21.00	.	.
Dose1	18.00	15.00	21.00	93.18	6.82
Dose2	17.50	16.00	22.00	93.18	6.82
Dose3	18.00	15.00	20.00	94.23	5.77

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**
PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Analysis of Variance (ANOVA) - overall F-test

Numerator df	Denominator df	F-stat	P-value
3	76	3.45	0.021

Dunnett - testing each trt mean signif. less than control
Williams - test assumes dose-response relationship, testing negative trend
Tukey - two-sided tests, all possible comparisons, not used for NOEC or LOEC

Level	Mean	Dunnett p-value	Isotonic mean	Williams p-value	Tukey p-values Dose1	Dose2	Dose3	Dose4	Dose5
Ctrl	19.05	.	19.05	.	0.038	0.038	0.103	.	.
Dose1	17.75	0.011	17.82	0.006	.	1.000	0.975	.	.
Dose2	17.75	0.011	17.82	0.006	.	.	0.975	.	.
Dose3	17.95	0.030	17.82	0.007	.	.	.	.	.

SUMMARY	NOEC	LOEC
Dunnett	<lowest dose	Dose1
Williams	**<lowest dose**	**Dose1**

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE WTGAINM (Male wt gain)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.833	<.001	4.261	0.008	USE NON-PARAMETRIC TESTS

****
**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	20	2.15	4.22	0.94	196.33	0.17, 4.13
Dose1	20	-1.05	3.02	0.67	-287.34	-2.46, 0.36
Dose2	20	-0.40	2.96	0.66	-740.73	-1.79, 0.99
Dose3	20	-4.50	8.58	1.92	-190.69	-8.52, -0.48

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	1.00	-3.00	15.00	.	.
Dose1	-1.00	-7.00	6.00	-48.84	148.84
Dose2	-0.50	-4.00	5.00	-18.60	118.60
Dose3	-2.00	-34.00	5.00	-209.30	309.30

****
**
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	11.65	0.009

MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	1.00	.	.
Dose1	-1.00	0.032	0.008
Dose2	-0.50	0.066	0.024
Dose3	-2.00	0.007	0.001

SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	<lowest dose	Dose1
Jonckheere	**<lowest dose**	**Dose1**

Japanese quail repro, Chlormequat chloride, MRID 467152-14
ANALYSIS RESULTS FOR VARIABLE WTGAINF (Female wt gain)

TESTS OF ASSUMPTIONS FOR PARAMETRIC ANALYSIS
Shapiro-Wilks test for Normality of Residuals -- alpha-level=0.01
Levenes test for homogeneity of variance(absolute residuals) -- alpha-level=0.05
Use parametric analyses if neither test rejected, otherwise non-parametric analyses.

Shapiro-Wilks Test Stat	Shapiro-Wilks P-value	Levenes Test Stat	Levenes P-value	Conclusion
0.922	<.001	1.225	0.307	USE NON-PARAMETRIC TESTS

****
**
BASIC SUMMARY STATISTICS

Level	N	Mean	StdDev	StdErr	Coef of Var	95% Conf.Interval
Ctrl	20	-4.20	4.84	1.08	-115.25	-6.47, -1.93
Dose1	20	-7.20	7.72	1.73	-107.26	-10.81, -3.59
Dose2	20	-3.15	7.22	1.61	-229.22	-6.53, 0.23
Dose3	20	-5.30	4.64	1.04	-87.45	-7.47, -3.13

Level	Median	Min	Max	%of Control(means)	%Reduction(means)
Ctrl	-4.00	-12.00	8.00	.	.
Dose1	-5.00	-28.00	3.00	171.43	-71.43
Dose2	-2.00	-20.00	14.00	75.00	25.00
Dose3	-6.00	-12.00	11.00	126.19	-26.19

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**
NON-PARAMETRIC ANALYSES - use alpha-level=0.05 for all tests
Kruskal-Wallis test - equality among treatment groups

Degrees of Freedom	TestStat	P-value
3	4.24	0.237

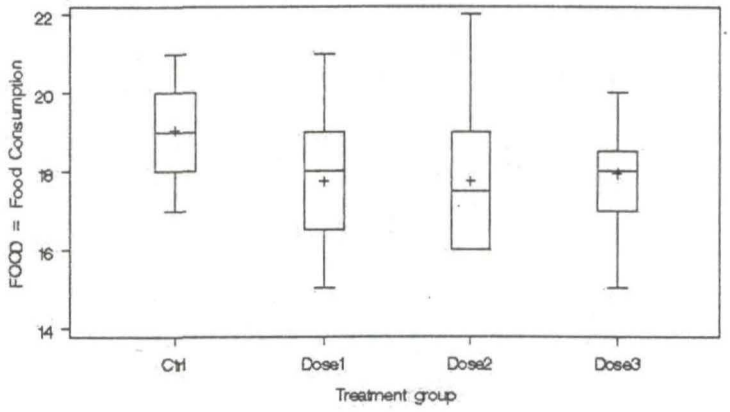
MannWhit(Bon) - testing each trt median signif. less than control
Jonckheere - test assumes dose-response relationship, testing negative trend

Level	Median	MannWhit(Bon adjust)p-value	Jonckheere p-value
Ctrl	-4.00	.	.
Dose1	-5.00	0.480	0.154
Dose2	-2.00	1.000	0.765
Dose3	-6.00	0.500	0.292

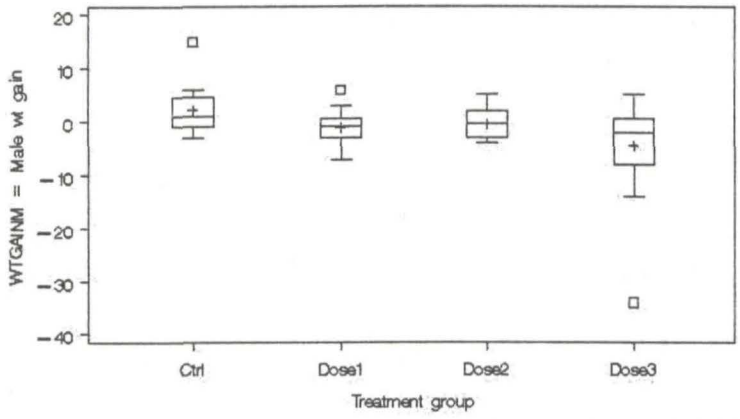
SUMMARY	NOEC	LOEC
MannWhit (Bonf adjust)	Dose3	>highest dose
Jonckheere	Dose3	>highest dose

Box Plots:

Japanese quail repro, Chlormequat chloride, MRID 467152-14



Japanese quail repro, Chlormequat chloride, MRID 467152-14



Japanese quail repro, Chlormequat chloride, MRID 467152-14